SEXUALITY PRESERVING RADICAL CYSTECTOMY

Essay

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ
(وَأَنْزَلَ اللهُ عَلَيْكَ
الْكِتَابَ وَالْحِكْمَةَ
وَعَلَّمَكَ مَا لَمْ تَكُنْ تَعْلَمُ
وَكَانَ فَضْلُ اللهِ عَلَيْكَ
عَظِيمًا)

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INTRODUCTION

Radical cystectomy with urinary diversion remains the primary form of therapy for appropriate candidates with high-grade, invasive bladder cancer. Standard radical cystectomy for bladder cancer consists of removal of the bladder, prostate, perivesical fascia, seminal vesicles and vasa deferentia in males. In this procedure the autonomic nerves, which are essential for a normal sexual response are often removed or damaged. Walsh described the anatomy of the pelvic innervation and showed how the neurovascular bundles containing cavernous nerves could be preserved during prostatectomy ***(Walsh et al., 1983)***. Similarly description of the nerve sparing cystoprostatectomy techniques followed.

Patients who have an invasive bladder cancer, stages T2-T4, are currently treated with radical surgery, radiotherapy, chemotherapy or with a combination of these approaches ***(Sternberg, 2002)***. According to available data, radical cystectomy with urinary reconstruction represents the most effective way for treating such cases, accompanied by cure rates that oscillate between 53% to 80%, when there is no regional or systemic extension of the disease ***(Sternberg, 2002)***.

Despite its therapeutic advantages, radical cystectomy represents a major intervention, accompanied by morbidity rates that should not be disregarded. In addition to the inherent post-operative complications, radical cystectomy presented, in the past, 2 serious drawbacks.

1- An incontinent cutaneous urinary diversion, which constrained them to bear urine-collecting bags, with all the resultant psychological and social drawbacks.

2- Erectile dysfunction almost all male patients developed erectile dysfunction, which compromised their quality of life.

Upon the introduction of orthotopic intestinal neobladders in the urologic practice ***(Barre et al., 1996)*** and the description of the technique that allowed the preservation of cavernous neurovascular bundles ***(Schlegel and Walsh, 1987)***.The drawbacks of cutaneous ostomies and sexual dysfunction were both mitigated ***(Soulie et al., 2001)***.

On the other hand, the sexual function of the female after anterior exenteration has received scant attention. These patients often are left 'impotent', i.e. unable to tolerate vaginal penetration after anterior exenteration. Female sexual dysfunction is prevalent after standard radical cystectomy, and in younger population, sexual dysfunction is an important concern. With orientation of anatomy and neuroanatomy oncologic control of bladder cancer, with preservation of neurovascular bundles and other adjacent structures such as the vagina and cervix.

Nerve fibers from the pelvic plexus run beside the lateral walls of the vagina to the bladder neck and urethra. Historically, radical cystectomy removed or damaged the neurovascular bundles on the lateral walls of the anterior vagina, causing significant devascularization of the clitoris. Clitoral devascularization also occurs with removal of the distal urethra. Urethral sparing and neurovascular preservation potentially saves the nerves and vasculature ***(Bhatt et al., 2006).***

AIM OF THE WORK

To review the advantages and disadvantages of sexuality preserving radical cystectomy (SPRC) in minimizing the morbidity of radical surgery concerning sexuality and continence and also the possible effect of this surgery on radicality.

NEURO ANATOMY OF MALE SEXUAL FUNCTION

Sexual function requires participation of autonomic, somatic nerves and integration of numerous spinal and supra spinal sites in the central nervous system. Penis is only a single component of this complex ***(Jefferson and Chrlottesvill, 2000).***

Peripheral innervation of the penis

The penis receive innervation from sacral parasympathetic (pelvic), thoraco-lumbar sympathetic and somatic pudendal nerves ***(Chuang and Steers, 1997).***

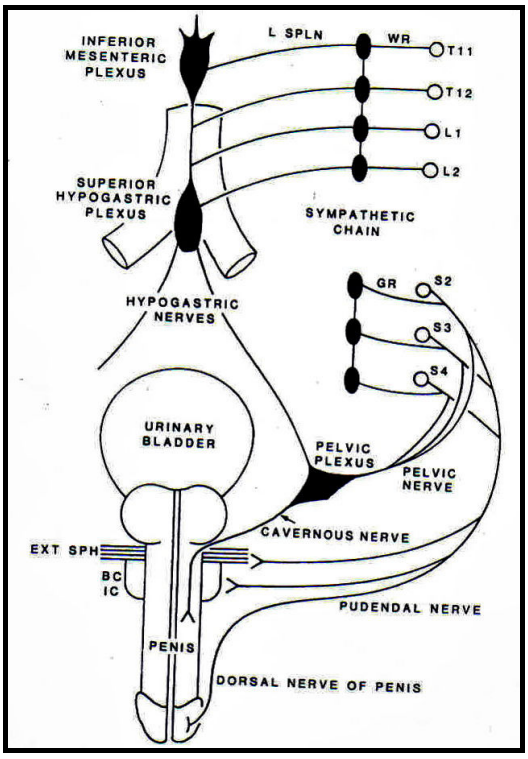

Fig. (١): Parasympathetic, sympathetic and Somatic efferent pathways to the penis (***Quoted from Jefferson and Chrlottesvill, 2000).***

Sympathetic innervations

The sympathetic nerve fibers originate from the intermediolateral gray matter of the spinal cord segments T10-L2 and pass through the ventral root into the white ramus communicans and then to the sympathetic trunk. From there on they proceed via the lumbar splanchnic nerves, at fist lateral to, and then in front of, the aorta into the inter-mesenteric plexus and on to the superior hypogastric plexus at the level of the aortic bifurcation. The superior hypogastric plexus splits into the left and right hypogastric nerves that pass inferolaterally along the perirectal fascia medial to the ureter and just beneath the peritoneum on both sides toward the pelvic plexus (inferior hypogastric plexus). This is situated anterolaterally to the sigmoidorectal junction ***(Kessler et al., 2005).***

Parasympathetic innervations

Parasympathetic nerve fibers arising from the intermediolateral cell column of the sacral cord S2-S4 run in the pelvic splanchnic nerve along the lateral aspect of the rectum to join the hypogastric nerves and from the pelvic plexus.

The pelvic plexus consists of a variable network of both sympathetic and parasympathetic fibers and is located lateral to the rectum, bladder, seminal vesicles and prostate/vagina. Additional fibers join the pelvic plexus directly from the sacral sympathetic ganglia. Mixed sympathetic and parasympathetic fibers pass from the pelvic plexus to supply the pelvic viscera

with a dual autonomic innervation. Autonomic fibers from the pelvic plexus, including afferent and efferent fibers, innervate the rectum and the urogenital tract and end as the paraprostatic neurovascular bundle or paravaginal plexus before supplying the urogenital diaphragm, sphincter, and erectile organs. ***(Kessler et al., 2005).***The pelvic plexus is rectangular and is 4 to 5 cm long, and its midpoint is at the tips of the seminal vesicles ***(Schlegel and Walsh, 1987).*** It is oriented in the sagittal plane on either side of the rectum and pierced by the numerous vessels going to and from the rectum, bladder, seminal vesicles, and prostate. Division of these vessels (the so-called lateral pedicles of the bladder and prostate) risks injury to the pelvic plexus with attendant postoperative impotence ***(Walsh and Donker, 1982; Walsh et al., 1983).*** The right and left components of the pelvic plexus communicate behind the rectum and anterior and posterior to the vesical neck. Branches of the pelvic plexus follow pelvic blood vessels to reach the pelvic viscera, although nerves to the ureter may join it directly as it passes nearby. Visceral afferent and efferent nerves travel on the vas deferens to reach the testis and epididymis.

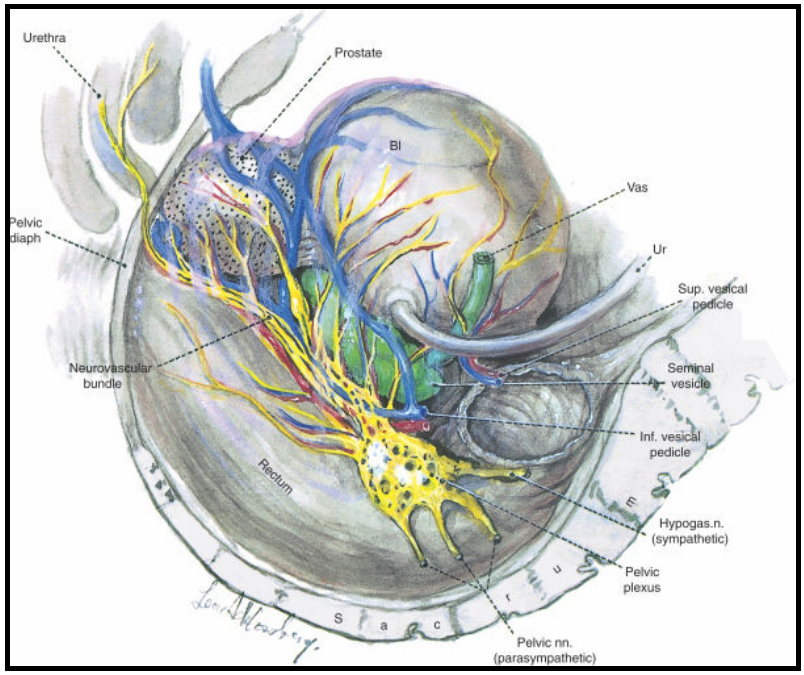

Fig. (٢): Lateral view showing the left pelvic autonomic nervous plexus and its relation to the pelvic viscera. Bladder, ureter ***(Quoted from Schlegel and Walsh, 1987).***

The most caudal portion of the pelvic plexus gives rise to the innervation of the prostate and the important cavernosal nerves ***(Walsh and Donker, 1982).*** After passing the tips of the seminal vesicles, these nerves lie within leaves of the lateral endopelvic fascia near its juncture with, but outside, Denonvilliers' fascia ***(Lepor et al., 1985).*** They travel at the posterolateral border of the prostate on the surface of the rectum and are lateral to the prostatic capsular arteries and veins Because the nerves are composed of multiple fibers not visible on gross inspection, these vessels serve as a surgical landmark for the course of these nerves **(the neurovascular bundle of Walsh).** During radical prostatectomy, the nerves are most

vulnerable at the apex of the prostate, where they closely approach the prostatic capsule at the 5- and 7-o'clock positions. On reaching the membranous urethra, the nerves divide into superficial branches, which travel on the lateral surface of the striated urethral sphincter at 3- and 9-o'clock positions, and deep fibers, which penetrate the substance of this muscle and send twigs to the bulbourethral glands. As the nerves reach the hilum of the penis, they join to form one to three discrete bundles, related to the urethra at 1- and 11-o'clock positions, superficial to the cavernous veins, and dorsomedial to the cavernous arteries ***(Lue et al, 1984; Breza et al., 1989).*** With the arteries, they pierce the corpora cavernosa to supply the erectile tissue .Small fibers also join the dorsal nerves of the penis as they course distally. In the female, the nerves to vestibular bodies and corpora cavernosa of the clitoris travel between the anterior vaginal wall and the bladder in association with the lateral venous plexuses.

Course of cavernous nerves

The sympathetic and parasympathetic nerves merge to from the cavernous nerves. Which exit the pelvic plexus reside in pelvic fascia before it fuses with the prostatic capsule and travel along the postero lateral aspect of the prostate. At the prostatic apex the nerves are only a few millimeters from the urethral lumen, then exit the pelvis by two routes, one group of fibers lies between the fascia of the levateor ani and urthra, another group enter the striated uethral sphincter at the